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The JOURNAL *of* GEOGRAPHY

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TROPIC ISLES IN THE PENDING SETTLEMENT

A newspaper dispatch dated Vancouver, B. C., August 26, reads thus:

Four fast freight trains, aggregating fifty-five cars, left here this afternoon for New York, with the right of way over everything, including passenger trains, clear across the continent. They carry $10,000,000 worth of silk, landed from the *Empress of Asia,* which arrived from Hongkong last night. The value constitutes a record.

Two thousand years ago silk trains were leaving China, but they were camel trains traveling westward by slow stages across the desert wastes of Asia. The eastward route across that "waste of waters" the Pacific Ocean is a new thing as time is measured in the Orient. The instance quoted above is an eloquent illustration of the rapid if late development of the "finest highway in the world."

THE PACIFIC AS A WORLD HIGHWAY

The first step in the development of the Pacific as a world highway may perhaps be traced in Captain Cook's voyage of the latter part of the eighteenth century, the first result of which was the foundation of British settlement in Australia. But the Pacific highway only begins to assume importance in the latter half of the nineteenth century. This half-century saw the spread of English-speaking peoples along certain sections of the Pacific seaboard. The population of Australia, only 200,000 in 1840, had increased to 1,000,000 in 1858, to 2,000,000 in 1877. California was ceded to the United States in 1848; the rise of the Oregon territory followed; Alaska was purchased; the opening up of British Columbia commenced. At the same time and through the agency of English-speaking peoples eastern Asia was awakened to the

demands of modern commerce. Just before the mid-century Great Britain had entered into her first commercial treaty with China, securing the cession of Hongkong and the opening of four treaty ports additional to Canton. Just after the mid-century Commodore Perry opened the long-closed doors of Japan (1).

THE SOUTH SEAS

But the broad expanse of the Pacific, occupying over one-third of the entire surface of the globe, is not merely a highway. In that portion known as the South Seas it is a highway amply provided with way-stations. Robert Louis Stevenson's classic description may be recalled (2).

> That wide field of ocean, called loosely the South Seas, extends from tropic to tropic, and from perhaps 120 degrees W. to 150 degrees E., a parallelogram of one hundred degrees by forty-seven, where degrees are the most spacious. Much of it lies vacant, much is closely sown with isles.

It is the islands that give special interest to the South Seas, for though most of them are small individually, in the aggregate they constitute a great tropical empire. Not only are they valuable as telegraph, aviation, and coaling stations on the highways of the sea; they have an intrinsic value in their natural resources. The western peoples penetrating the Pacific found the islands desirable for strategic and economic reasons and they found them in possession of so-called savages, though some of these "savages" exhibited no mean degree of primitive culture. The inevitable result was partition of the South Sea Islands.

In the modern colonizing period the first power to take definite possession of any of the islands was France, who assumed control in part of the Society Islands, in the Marquesas and other groups in the eastern Pacific in 1842-3. Later she acquired the large island of New Caledonia. To the United States fell the Hawaiian Islands and the Philippines; the midway station of Guam, American Samoa with its wonderful harbor of Pagopago and several tiny islets, some not much more than mere rocks (3).

GERMANY'S POSSESSIONS IN THE SOUTH SEAS

Germany entered late into the field but, with considerable adroitness, succeeded in securing possessions whose total area was

about 95,000 square miles. Her Pacific domain included the northeastern portion of New Guinea (Kaiser-Wilhelmsland), 70,000 square miles; the Bismarck Archipelago and part of the Solomons, 22,000 square miles; German Samoa, 1,000 square miles; the Caroline, Marianne and Marshall Islands, groups east of the Philippines, 1,000 square miles.

Germany lost her Pacific possessions early in the war. On May 7, 1919, it was decided in Paris that mandates should be held for the former German possessions: German Samoa by New Zealand; Nauru Island by the British Empire; other possessions south of the equator by Australia; north of the equator by Japan (Statesman's Yearbook, 1919). The loss that Germany thus sustains may better be appreciated by a survey of the general character and value of the Pacific islands (4).

"HIGH" AND "LOW" ISLANDS

In the South Seas "no distinction is so continually dwelt upon," says Stevenson, "as that between the 'low' and the 'high' island."

> The Himalayas are not more different from the Sahara. On the one hand, and chiefly in groups of from eight to a dozen, volcanic islands rise above the sea; few reach an altitude of less than 4,000 feet; one exceeds 13,000 feet; their tops are often obscured in cloud, they are all clothed with various forests, all abound in food, and are all remarkable for picturesque and solemn scenery. On the other hand, we have the atoll . . . . rudely annular in shape; enclosing a lagoon; rarely extending beyond a quarter of a mile at its chief width; often rising at its highest point to less than the stature of a man—man himself, the rat and the land crab, its chief inhabitants; not more variously supplied with plants; and offering to the eye, even when perfect, only a ring of glittering beach and verdant foliage, enclosing and enclosed by the blue sea.

Between large volcanic island and tiny atoll there is every gradation and many combine features of both volcanic and coral origin. Their physical characteristics have been described in detail in the *Journal* by Professor W. M. Davis (5). Whether high or low, however, the factors of prime importance to human life on the islands are the same and these are the encompassing sea and the coconut palm. What the camel and the date palm are to the Sahara dweller, the sea-going canoe and the coconut palm are

to the South Sea islander. There is no place here to speak of the extraordinary skill the Polynesians have shown as navigators, nor of their journeys of hundreds of miles across trackless and uncharted seas. Their day as navigators is over; the coconut palm remains.

THE COCONUT PALM, STAFF OF LIFE IN THE SOUTH SEAS

The coconut palm flourishes on many coral islets where few other plants can maintain an existence. It is found everywhere through the South Seas for it is furnished with special means of dispersal. The trees grow right down on the shore, their fronds overhanging the water and the thick, fibrous husk enables the seed to stand a long sea journey.

To the native the uses of the coconut are infinite. The roots are employed medicinally; the wood of the trunk, though not very durable, is used in house, bridge and boat construction; the leaf, in thatching and in making baskets and mats. Palm wine is distilled from the flower and flower-stalk. The husk gives fiber for ropes, cordage and brooms; so strong and durable is the material that the Japanese, now in occupation of the Marshall Islands, are said to be contemplating its manufacture as a commercial venture. The shell provides drinking cups and fuel. On the more barren islands coconut and fish may be the only food of the people and in some villages where there are no springs the fluid of the green nut is the only drink; everywhere the nut is important as a source of food.

Copra, the dried kernel of the nut, is the source of an oil of commercial value; herein lies the chief commercial interest in the South Sea Islands.

COPRA AND COCONUT OIL

The world demand for edible fats, that has increased so enormously of late, has been met for the most part by the use of vege table oils, among which coconut oil ranks first. It is also used in the manufacture of soap and candles and a constantly growing variety of industrial products. Twenty years ago a ton of copra might be bought for the price of a few sticks of tobacco; to-day the price is not less than $200 a ton. With this increased demand the commercial world can no longer depend on the casual collec-

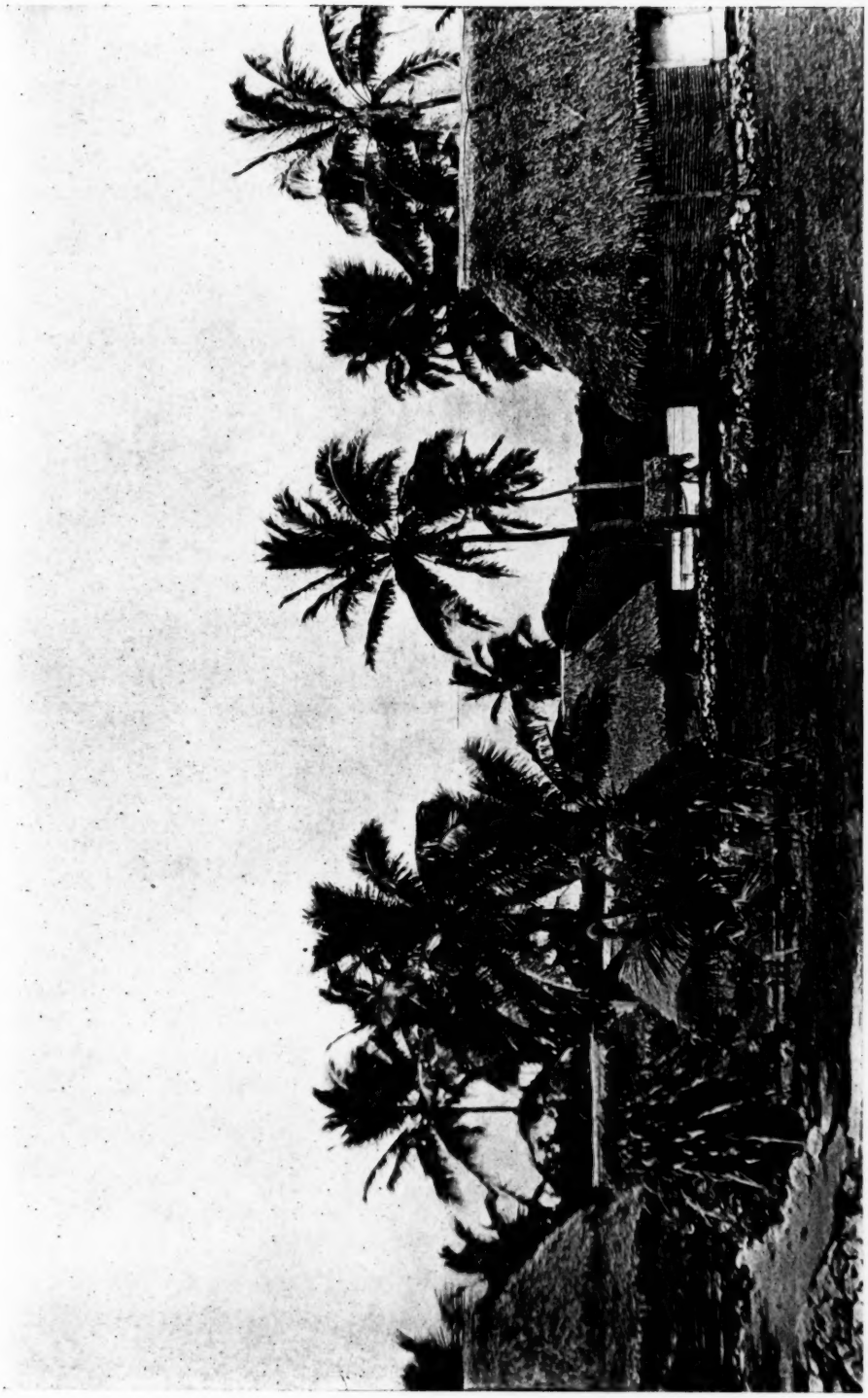

FIG. 1—A Fijian Village. The coconut palm, the wherewithal of life in the South Sea Islands, is everywhere a dominant feature in the landscape. (Photograph by W. G. Foye.)

tion of copra from the natives. The modern coconut plantation is the outcome of scientific agriculture. It is planted with selected seed and carefully cultivated and under such conditions is very productive. The chief difficulty encountered is that of labor.

The Labor Question

In most of the Pacific islands the native population is none too numerous—it suffered greatly at the first contact with modern civilization—and furthermore it finds regular labor exceedingly unattractive. The islands of the coconut palm are veritably the land of the lotus-eaters. Where coconut palms are most plentiful the white man has found it most difficult to induce the native to work. On the islands where flourish other tropical cultivations requiring still more labor, as the sugar plantations of Hawaii and the Fiji islands, the labor situation is still more difficult. An attempted solution has been the introduction of labor from eastern Asia. Thus has been set in operation great movements of peoples whose final result it is difficult to estimate, for the social and political consequences must be as far-reaching as the economic. Japanese now form between one-third and one-half the population of the Hawaiian islands; there is a similar proportion of Indian coolies in the Fiji islands and Chinese coolies have been introduced in considerable numbers into German Samoa. Closely related is that most burning of Australian questions, that of a "White Australia," the problem of keeping Australia a white man's continent and at the same time developing the northern tropical portion that forms one-third of the entire area.

Other Tropical Cultivations

As we have said the labor problem is most acute in the larger islands where, in addition to the growth-promoting qualities of the warm and equable temperature, the rainfall is generally more abundant and productivity is wonderfully great. In eastern New Guinea there are already plantations of rubber, cacao, sisal hemp, cotton, tobacco and coffee, and systematic cultivation has only just begun; the greater part of the interior, both of the British and former German sections, is still unexplored. The Solomon Islands, the

largest of which was owned by Germany, have been described as "dreams of fertility." They have many fine rubber plantations. Beautiful German Samoa, the "Pearl of the Pacific," had before the war begun the export of cacao and rubber as well as copra. The resources of Hawaii and the Philippines are well known.

MINERALS AND PHOSPHATE

The coral and volcanic islands are lacking in mineral wealth, but on the continental islands—once part of a greater Australia—mineral resources are known to exist. It is mineral wealth that gives a special significance to the French island of New Caledonia, for the island is rich in nickel, a metal of comparatively limited distribution, and in cobalt and chromium, used in the production of special steel. Gold and copper are worked in Papua (British New Guinea); coal and petroleum and other minerals have been found and the same geological formations extend into the former German territory, and there are undoubtedly mineral resouces in the Bismarck Archipelago.

The Pacific islands also afford a resource of unique value—phosphate of lime. On certain of the low oceanic islands subject to drought, bird-guano has become assimilated with coral rock into this extremely valuable fertilizer. Two islands are specially so distinguished, Ocean Island, one of the Gilberts (British), and Nauru, formerly belonging to Germany. They have been described as veritable lumps of phosphate. Nauru is the richest phosphate deposit known. This island has an area of 3 square miles and rises only 20 feet above sea level; its population is 1,538 inhabitants. The island of Angaur also contains valuable deposits of phosphate; it lies north of the line and is now in the occupation of Japan.

YAP ISLAND AND SAMOA AS STRATEGIC POINTS

Allusion has been made to the strategic value of the Pacific islands. Lately a good deal has been heard of the significance of Yap Island in this respect. Yap Island, administrative center of Germany's western Micronesian possessions, is a center for cable and radio communications. It has a special interest for the United States, lying as it does midway between Guam and the Philippines.

The Samoan islands also occupy a strategic situation which has been greatly enhanced by the opening of the Panama Canal: they lie on the sailing route from the Canal to New Zealand.

BIBLIOGRAPHICAL REFERENCES

(1) Two recent books dealing with general problems of the Pacific are: C. Brunsdon Fletcher: The New Pacific, British Policy and German Aims. Macmillan and Co., 1917. C. Brunsdon Fletcher: Problems of the Pacific. Holt and Co., 1919. The former discusses specifically the question of the South Sea Islands; the latter the question of the Pacific in its broadest aspect.

(2) Robert Louis Stevenson: In the South Seas. An edition, price $1.00, is published by Scribners (1916). The quotations are from Part II, The Paumotus.

(3) Clement Biddle: Some Pacific Islets Appertaining to the United States, *Bull. Geographical Soc. of Philadelphia.* Vol. 16, 1918, pp. 92-100.

(4) Sir William Macgregor: The Settlement of the Pacific, *Scot. Geogr. Mag.*, Vol. 34, 1918, pp. 161-177.

(5) W. M. Davis: The Reef-encircled Islands of the Pacific, *Journ. of Geogr.*, Vol. 17, pp. 1-8; 58-68; 102-107.

A TECHNICAL COURSE IN ECONOMIC GEOGRAPHY*

By ANDRÉ ALLIX
Lycée de Lyon

A remarkable proof of the vitality of French industry was given during the war. When the great industrial region of northern France was occupied by the enemy there was a general transference of industrial activity to the southeast. The center of development there is the city of Lyons where, among the signs of the solidarity of the new economic movement, was the establishment during the war of a higher Technical School for Girls. The school was opened in October, 1917, with 71 pupils; during the school year following (1918-1919) its enrollment numbered 132.

THE TECHNICAL SCHOOL AND ITS PURPOSE

The aim of the school, which provides a two-year course, is "to give to young girls of good general education—tested by an entrance examination—practical instruction that will enable them to fill desirable positions in the field of commerce and industry."

* The French text of this article is appearing in a contemporary number of *L'École du Travail,* Paris.

This means a training for responsibility and leadership, or, according to the American term, for executive position rather than that of the mere directed worker. Hence the instruction to be given must not only be of relatively advanced standard for advanced pupils—the minimum age requirement is 16 years—but it must be of a type to develop the creative faculties rather than simple adroitness of execution.

The school has both an industrial and a commercial section. The latter includes the subject of economic geography of which the writer has the honor to be in charge. He here proposes to discuss the principles upon which his program and methods of instruction are based.

ECONOMIC GEOGRAPHY IN THE TECHNICAL SCHOOL

The time devoted to the study of economic geography is relatively limited: three hours a week in the first year, two hours in the second year. This makes it imperative to restrict the subject matter as far as possible to material of a distinctly economic character. It presupposes therefore that the students at their entrance into the school shall have an adequate knowledge of geographic nomenclature and of general and regional geography. To ensure fulfillment of this condition, whereby due profit may be obtained from the course, the entrance examination is made sufficiently searching.[1] The prerequisite is met by the geographical instruction in the three years of study in the Primary High Schools (Écoles primaires supérieures) which teach elements of general geography, elementary regional geography of France, of Europe, and of the world. On the basis of general knowledge here obtained the Technical High School proceeds to an instruction in detail of the facts of world production, circulation, and exchange—that is to say of economic life.

PROGRAM OF FIRST-YEAR STUDIES

The program of studies for the first year is devoted to the resources of France and of her colonial empire. It embraces the threefold division:

[1] Besides the requirements in geography the pupil is expected to show a thorough grounding in the French language, the metric system, arithmetic, the first two books of geometry, and the elements of algebra.

A. *Agriculture and the Derivative Industries.* The vine and the wine industry; cereals; industrial cultivations; fruits, vegetables, and flowers; forests and forest industries, including paper; stock raising and its products, including the milk industry; fish; preserved foods.

The study of each item is pursued according to definite plan: physical and economic conditions, with some attention to historical development; great regions of production in France and thence in the colonies; principal markets and competitors; place of the products in French commerce and (briefly) in world commerce.

B. 1. *Industrial Resources.* Fuels; hydroelectric power; metals and metal industries; textiles; secondary industries. Each item is studied in its relation to physical and general economic conditions; its place in the general economic life in France and (briefly) in the world.

2. *French Industrial Regions.* Northern France, Paris region, Eastern France, Normandy, Languedoc, Aquitaine, French Alps, and, in most detail, the Lyons region. The study of each according to: general geographic conditions; chief productions; system of production and (briefly) its effects on the population; commercial relations. Principles of the division of France into economic regions.

C. *Trade and Transportation (Domestic).* Chief natural thoroughfares. Roads, rivers, canals. Chief railways; trunk lines. Sites of the great commercial towns, their rôle, their mutual relations; markets and fairs. The great ports; their evolution, present rôle, and future possibilities.

Program of Second-Year Studies

The program of studies for the second year is devoted to the economic life of the world. It embraces the three parts:

A. *The Great Products and Industries.* Food products—grains, rice, vegetables and fruits, sugar, spices, cacao;

beverages—wine, beer, tea, coffee; products of stock raising—meat, wool, hides and skins; fish; fats; alcohol; textile and analogous products—cotton and the cotton industry, the woolen industry, silk, linen, hemp and jute, rubber; fuels and power; metals; various mineral and chemical products and corresponding industries.

Great routes of international commerce; great markets; ports; postal and telegraphic relations.

B. *The Economic World of Today.* Chief economic powers; the study of each according to general geographic conditions, present economic state, source of imports and destination of exports, economic ambitions and probable future, leading economic questions of the time, and political problems likely to be entailed.

C. *Place of France and the French Colonial Empire in World Commerce.* Foreign trade of France, its evolution and present organization; relations with colonies, with exporting and importing countries; open markets; relations of the colonies among themselves and with the rest of the world; projects for the future and conditions for their realization.

METHODS

The lecture represents only a relatively small part of the instruction. It is desirable to reduce this to a minimum in a technical school where the object of the instruction is to accustom the pupils to think and act for themselves. The method employed does not consist in imposing on the students, *ex professo,* ready-made knowledge. Oral instruction should be limited, as far as possible, to indicating for each question the chief groups of essential facts about it, together with the general ideas related to it. The pupils can then put to the proof the geographic methods whose value is thus taught. The threefold method embraces:

1. Actual use of sources of information.
2. Discussion of problems and use of general ideas.
3. Presentation of results.

Use of Geographical Data

The pupils are taught to know and to use judiciously the sources of geographical information.

A. For documentary material in general, the chief sources are furnished by the school library. The pupils make use of them throughout their commercial course; they first learn to know them, then to use them, taking therefrom the material—cartographic, bibliographic, statistical—which they require for their assignments.

Examples: Economic progress of Japan in the last quarter of the century; reasons.

Cultivation of cotton and its possibilities in the French colonies.

Geographical distribution of rubber and its markets; its transformation between 1910 and 1919.

The French iron market and the buying of coal.

Great Britain and economic imperialism.

Special stress is laid on the extent to which statistics are reliable; on the false precision of certain figures, the frequency of errors; on the necessity of reducing statistics to the same units for purposes of comparison, and the too-frequent impossibility of this operation. Insistence is also laid on the dating of cartographic or bibliographic references for purposes of comparison and for appraising them at their current worth. Furthermore, the pupils are kept in touch with geographic actualities by the assignment to each of a theme for presentation and defense before her classmates.

B. On the other hand, the use of concrete and first-hand material is encouraged. This is the purpose of the visits to factories, commercial establishments, warehouses, docks, and ports, appropriate to the stage reached by the pupils in their studies. Furthermore, they are invited to make daily individual observations of the facts around them to complete or illustrate the geographical assignments, and these they discuss before their fellow students and the instructor.

This form of work has the great advantage of giving the pupils contact with realities and of bringing before them the material facts which the textbook treats but briefly. Against this advantage, however, is offset the limited fraction of the world thus seen and the consequent risk of losing the sense of just proportions. To counteract this tendency attention must constantly be called to the relation between limited observation and the broader field beyond. Thus the pupil may become habituated to pass from the material expression of a fact to the general conception which alone can make it a profitable source of reflection and the basis of productive action.

Individual Problems

The pupils are likewise given opportunity for individual interpretation of economic problems whose geographical data have already been presented.

Examples: After the study of the geographic conditions of cattle raising in France, the problem, "Could the milk industry be developed in the French Pyrenees, and would this development be desirable?"

After the study of the geographic conditions of world silk production, the problem, "Would the organization of large-scale production of raw silk be a proposition of interest to the United States?"

After the study of hydroelectric resources, the question, "What are the countries where this industry must inevitably be developed?"

After the study of Switzerland as an economic nation, the questions, "Why are the metallurgical industries of Switzerland devoted to the production of articles of light weight and precise workmanship? What other countries are constrained to similar production, and why?"

Examine the possibility of realizing an "exclusive commercial state" (Fichte)[2] in (1) the United States; (2) the British Empire; (3) France.

[2] Reference to the theoretical conception of the German philosopher, Johann Gottlieb Fichte, of a self-contained socialist state in which no international trade is permitted (Der geschlossene Handels-staat, Berlin, 1800).

These exercises are designed to foster an appreciation of the interdependence of facts that necessarily enters into all geographical study. They encourage the formulation of general deductions from facts and the utilization of such deductions for the critical examination of problems of economic geography under past and present-day conditions and in the future.

The students are also given practice in the graphic presentation of facts of economic geography in the form of maps, curves, or diagrams, care being taken to select such concrete examples as best lend themselves to the particular forms of presentation.

The questions propounded, the field visits, the personal observations are also made the subjects of brief written reports which are discussed by the students in class and corrected by the instructor. In connection with this it may be noted that by collaboration between instructors the work in geography is often called upon to supply material for written or oral exercises in other subjects, especially for themes. Throughout the course the prevailing idea is to develop those qualities of precision, order, and clearness that are indispensable for commercial leadership.

THE BROAD INTERPRETATION OF ECONOMIC GEOGRAPHY

At the same time sight is never lost of the fundamental idea which inaugurates and guides the instruction—that economic facts are not abstractions, on the contrary that they arise from, and are closely determined by, geographic conditions. In the domain of economic geography it is the principles of general geography which permit explanation of the past and the present and thus—though the expression may seem high-sounding—prevision of the future. Hence the course of instruction, while it deals specifically with economic facts, seeks to develop them in their relation to general principles.[3]

In the broadest conception the endeavor is to awaken in the pupil a spirit of individuality, of observation, of critical discernment, a faculty for concrete analysis and for sound generalization, and a large view of the way things are united in space—which is

[3] The introductory lesson of the course, entitled "Economic Geography and General Geography" aims to demonstrate this principle. This lesson (published in full in the *Bull. Soc. de Géogr. du Maroc*, July, 1918, Casablanca) was abstracted in the *Journal* for March, 1919, pp. 94-96.

in fact the *geographical spirit*. The pupils are not constrained to amass facts; they are trained to the solution of problems for which they are furnished the means. There is no attempt at exclusive cultivation of the memory; the aim is to train the powers of judgment and to increase the capacity for action, that is efficiency.

BIBLIOGRAPHICAL NOTE

While the ideas expressed above have been developed during the course of the author's experience, he specially acknowledges aid and assistance gained from:

Jean Brunhes: La géographie humaine, 2nd edit., Paris, 1912. An English edition, by R. E. Dodge and Isaiah Bowman, will shortly be published by Rand McNally & Co.

J. G. Bartholomew: Atlas of the World's Commerce, London, 1907.

G. G. Chisholm: Handbook of Commercial Geography, 8th edit., London, 1911.

Henri Hauser: Géographie générale, classe de seconde, troisième partie, géographie économique, Paris, 1913.

Raoul Blanchard, professor of geography in the University of Grenoble, for exceedingly valuable illustrations and material (in part unpublished).

GEOGRAPHY AND THE IRISH QUESTION

By W. R. McCONNELL
Miami University

The Irish Question is of ancient date but it has lately taken on a new and acute aspect. For more than half a century the Nationalists have striven for "Home Rule," meaning by this a political independence similar to that now enjoyed by Canada or Australia. Some fifteen years ago, however, there was organized the Sinn Fein party. The last British Parliamentary election indicated that the Sein Fein party was in control; and the Sinn Fein, it is well known, stands for an Irish Republic entirely independent of Great Britain. They would make Ireland a nation by itself. It is the purpose of this article to discuss some of the geographic factors bearing on the Irish Question.[1]

[1] The geographic factor, of course, is not the only one nor is it easily separable from the economic, historic, and other factors. Much illumination on the general question is given in an article by Henry Seidel Canby, "The Irish Mind," in the *Atlantic Monthly* for January, 1919. See also the bibliographical references at the end of this article.

SOCIAL AND ECONOMIC CONDITIONS IN IRELAND

Population has been on the decline and economic conditions decadent in Ireland since the middle of the nineteenth century. In 1845 over 8,000,000 people lived in Ireland.[2] That was about one-half as many as lived in England and Wales, but the population has dwindled since then until today it is but little over 4,000,000. England has eight times as many people as Ireland and is over six times as densely populated.

This great decline in population has been due to emigration together with the—largely consequent—fact that there is a low birth rate and a high death rate in that country. With a birth rate of 23 for 1,000 inhabitants and a death rate of 17, the excess of births over deaths during the past ten years has been about 285,000. But over 300,000 people of Irish birth left Ireland during that time. The Irish-born population of the United States was 4,500,000 in 1910, a number somewhat greater than the population of Ireland at that date. The statement that there are four times as many people of Irish descent in the United States today as there are in Ireland is probably true.

Diminishing population and decadent economic conditions have gone hand in hand. The greatest economic decline has been along agricultural lines, because the rural districts have furnished by far the greater number of immigrants. City population actually increased during the time that Ireland as a whole lost nearly half of her people. The decline in agriculture is indicated by the fact that during the middle part of the nineteenth century Ireland had fifty per cent more land devoted to cereals than she now has. The decline in wheat has been from 743,000 acres in 1847 to 43,000 in 1912. The production of Irish potatoes has even decreased in the land which gave them their name. The acreage of land classified as permanent pastures has greatly increased, and there has been a marked increase in the production of cattle, sheep, and poultry. The raising of more live stock has not, however, overcome the economic loss due to diminished cereal production.

Furthermore, it is the most progressive element of rural Ire-

[2] This was an overpopulation for a nonindustrial people employing such methods and type of tillage as obtained. Extreme dependence on the potato caused a cataclysm when the potato harvests failed. Famine, eviction, emigration was the tragic sequence to the failure of 1845-47.

land that has gone with the exodus from the island, and it is not astonishing that poverty has increased. In 1860 one per cent of

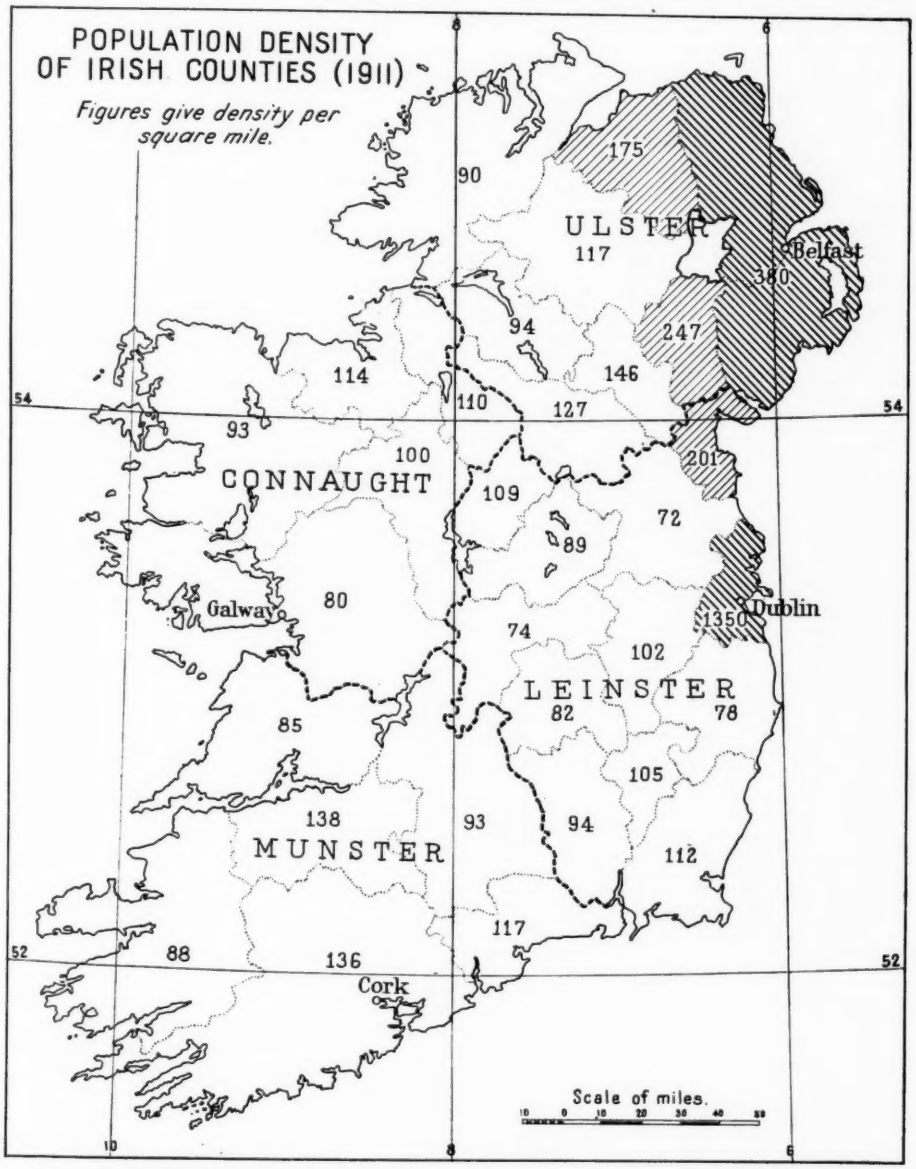

FIG. 1—Cartogram showing the distribution of population in Ireland by counties (1911). The counties of denser population (shaded) are in the east and northeast looking towards Britain. These are the only counties where manufacturing industry is important. For the rest of Ireland the most notable feature is the evenness of distribution. There is a higher density in the richer agricultural counties of Cork and Limerick, a smaller density in some of the poorer counties of the west but the range is not great. The lowest density, in Meath, is due to the attraction of Dublin for the adjacent rural districts.

the Irish were classed as paupers; in 1910 this had increased to over two per cent.

THE ECONOMIC BASIS OF IRELAND'S TROUBLES

By many of the Irish, England is held responsible for the long train of social and economic ills that has befallen them. They point to the restrictions imposed on Irish commerce and industry during the seventeenth and eighteenth centuries. They argue fatal consequences to Ireland in the establishment of free trade between Ireland and England in 1824. But to use these arguments as the sole or principal explanation of Ireland's misery is to claim a tendency toward industry that the island does not possess.

Ireland is not industrial in the modern sense of industry. She is naturally pastoral and agricultural. She has a good basis for prosperous agriculture, but no like basis for industry. With the exception of flax, which grows in the northeastern part, Ireland has practically none of the fundamentals of manufacture. The coal resources are very small; the possibilities of water power development, though not yet adequately studied, are not comparable with those of Great Britain, and the industrial utilization of the peat resources is still an unknown possibility of the future. On the other hand, it was demonstrated during the Napoleonic wars that the agricultural resources of Ireland were capable of supporting a population of 12,000,000 people, or nearly three times the present population.

The real cause of decline in the economic life of agricultural Ireland was the competition created by the opening up of the continental interiors through the agency of the railroad and by the progress in ocean transportation. By means of the railroad the American Middle West and other agricultural regions could transport their products to the seacoast where they could be received by British ships. Great Britain was then no longer dependent upon Ireland for agricultural products, as she had formerly been, and the Irish farmer was thrown into competition with the agricultural world. England bought her foodstuffs wherever she could get them most cheaply, and the resulting low prices discouraged Irish farmers and led to their exodus. They chose to leave rather than to remain and adjust themselves to the changing conditions.

The regeneration of Ireland must depend primarily on the development of Irish agriculture. In this direction steps have

already been taken: first by measures towards solution of the land question; second by improvements in agricultural methods. During the last fifty years a series of Land Acts has revolutionized land

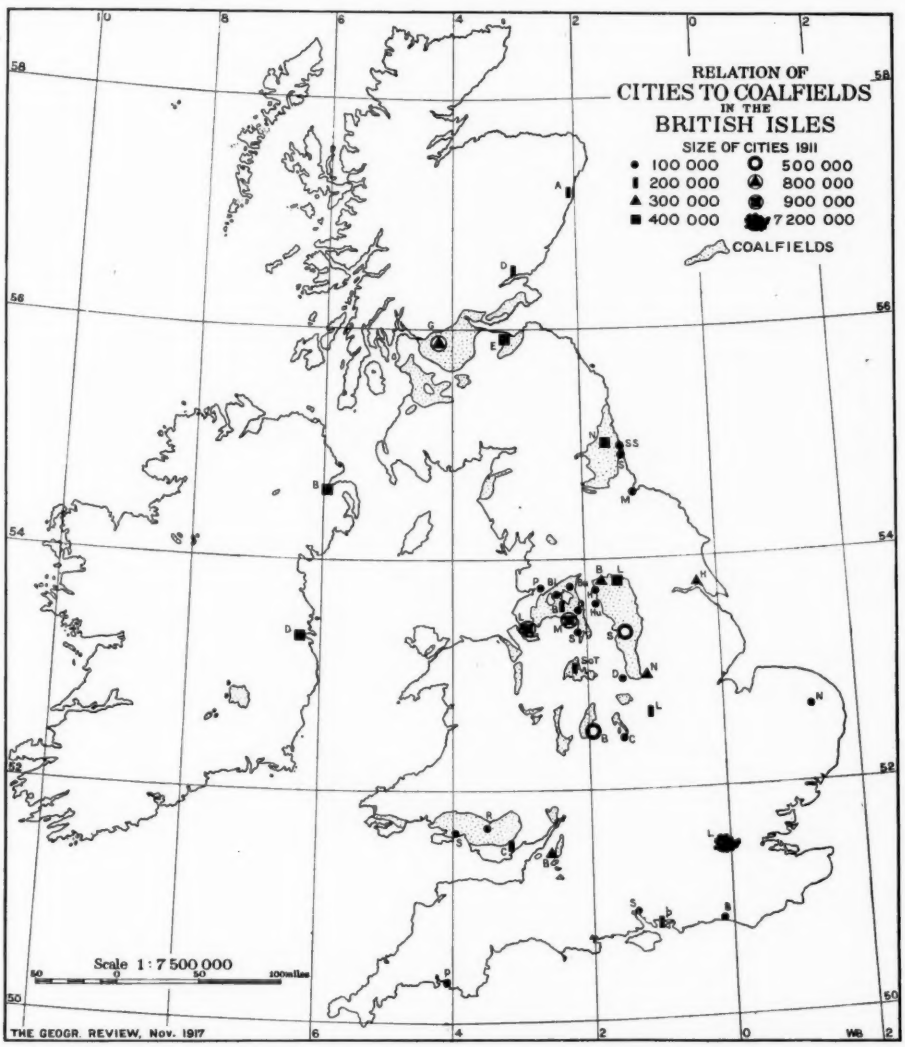

FIG. 2—Map of the British Isles showing the concentration of cities, that is of the industrial population, on the coalfields. This map, which should be read along with that of Fig. 1, is very suggestive of the industrial difference between Great Britain and Ireland. The Irish coalfields are small, scattered and of inferior quality. The two large cities of Ireland, centers of industry, face the industrial regions of Britain across narrow seas. Map by Mark Jefferson.

tenure in Ireland, landlordism being largely replaced by a system of peasant proprietorship. Closely related is the work of the "Congested Districts Board" that seeks to relieve conditions in those

areas where the holdings are too small to be economic; that is chiefly in the west where so high a percentage of the land is waste —bog or mountain. The agricultural problem includes the encouragement of tillage and of a more economic system of pastoral industry. The Irish Agricultural Organization Society, a voluntary association, and the Department of Agriculture, a state body, are working to these ends. The former works especially on the basis of co-operation, by the creation of agricultural and other co-operative societies aiming towards a general co-operative organization—a system in harmony with the mode of life in rural Ireland.

IRELAND AS PART OF THE UNITED KINGDOM

Ireland, it is said, is separated from Great Britain by a "sundering strait"; Ireland, it is further said, faces the Atlantic Ocean. Let us look further into these statements. In no place is the shallow Irish Sea which separates Ireland from Great Britain more than 140 miles wide, and in the narrowest part it is only 13 miles. The nearness of Ireland to Great Britain as compared with its nearness to any other market or source of raw material or power makes it inevitable that its life and development be intimately related to the country which it feels to be the cause of its economic backwardness.

The population map of Ireland shows that the densely populated portion of the island is the side nearest to England. This is by far the best endowed part of the country. The central lowland borders the Irish Sea on the east while westward the mountains of Connaught practically cut it off from the Atlantic. This central plain with its limestone soil and fertile glacial clay, comprising the richest agricultural section of Ireland, thus has its outlet not on the Atlantic but on the Irish sea, towards England. Furthermore this sea border of the lowland faces the Lancashire-Cheshire plain: Dublin is in direct line with the Cheshire Gap.

Eastern Ireland has much level land suited to agriculture and a rainfall favorable for the growth of cereals. The coast line of the Irish Sea has good natural harbors on which are built Ireland's large cities. Western Ireland, on the other hand, has much rough land, poor soil, and too much rainfall for successful agriculture. In

many places the rugged land borders the Atlantic with perpendicular cliffs, and there is a dearth of good harbors.[3] For these reasons western Ireland is much less prosperous than the side bordering the Irish Sea. Connaught contains more waste land than any other province. Thus the economic life of Ireland leads toward England and through England.

THE BASIS OF POLITICAL UNITY WITHIN THE UNITED KINGDOM

The unity of Great Britain is in no wise built on uniformity. The different physical units, such as the highlands of northern Scotland, the lowlands of south-central Scotland, the highlands of Wales, and the plains of England, have served as more or less well-defined units for the development of people with different ideas and ideals, of different racial origins and different languages, and of different modes of life.[4]

Two forces have made for the national unity of the several natural units—the superiority of England and the interrelation between the different regions. England's superiority is due to her geography—her location, topography, and resources. The plain of southeastern England lies open to the continent which it closely approaches. Thence people and movements from southern and central Europe naturally converged. With a climate less humid than the western highlands the English lowland with its arable soil is excellently suited to agriculture. On its northwestern edge it is bordered by mineral deposits, notably a series of coal basins. Here, then, on the English lowland was found the geographic basis for a dominant people. England's superiority today is indicated by the fact that out of a total population of 45,000,000 people living in the United Kingdom, 35,000,000 or over three-fourths live in the English unit.

The union of the other units with England is a perfectly natural one. Wales is not situated so that she can carry on rela-

[3] A project to make Galway a port to deal with American and Canadian trade is now under discussion. In connection with it is a proposal to run a train ferry across the Irish Sea.

[4] The largest number of people in the United Kingdom speaking a language other than English is found in Wales. Nearly 200,000 of the people of Wales (in 1911) could not speak English, and 800,000 were bilingual—a total of 40 per cent of the population of the Principality.

tions with the outside world independently of England and at a relatively early date this Principality was brought into union with England. Scotland, because of her great proportion of rugged surface with rigorous climate and scant resources, was dominated by England and followed Wales into the Union.

Ireland was the last unit to come into the United Kingdom. She was brought in when England began to depend upon the sea. The union of Great Britain and Ireland grew out of necessity. The union, it was claimed at the time, was for the defense of Great Britain and her colonies.

Lying to the oceanward side Ireland occupies a strategic position with respect to England. The defense of this strategic position is vital to British interests. Napoleon in his wars with England planned to attack by way of Ireland, and in the late war Germany sought on more than one occasion to use Ireland as a base for attacking England. Some of the largest industrial and shipping centers of Great Britain are on the side nearest to Ireland—Glasgow, Liverpool, Birkenhead, Manchester, Swansea, Cardiff, Bristol. Ireland, from her strategic position, could seriously interfere with British commerce should she become hostile or fall into the hands of a nation unfriendly to England. An independent Ireland would need forts and navy yards and a strong land and sea force—defensive measures that she lacks the wealth and man power to provide.

THE "TWO IRELANDS"

There is a pronounced division of the people within Ireland regarding the question of political independence, a division that is the expression of more fundamental differences.[5] There are, says Sir Horace Plunkett, "two Irelands, differing in race, in creed, in political aspiration, and what I regard as a more potent factor than all the others put together—economic interest and industrial pursuit."

Ulster is the home of the Unionists, who form the great bulk of its population of 1,600,000. The other three provinces, Mun-

[5] See the map showing election returns accompanying the article "Geographical Influences in British Elections" by Edward Krehbiel, *Geogr. Rev.*, Vol. 2, 1916, pp. 419-432.

ster, Leinster, Connaught, have only a scattering of Unionists in their combined population of 2,800,000. But the Unionists, although they are thus outnumbered two to one, have some decided advantages. Ulster is the chief center of industry and wealth in Ireland. Agriculture is here on a higher plane than in any other province. Because of favorable climate practically all of the flax grown in Ireland is here produced and here localizes the famous Irish linen industry. The manufacturing establishments of Ireland are almost wholly centered in Ulster because of its good harbors, cheap sea communication with the coalfields of Scotland, and easy access to the British and European markets. Belfast is one of the most important shipbuilding centers of the United Kingdom. Practically the entire fleet of the White Star line was built there.

The severance between the two Irelands is deep, and it is this severance that is particularly responsible for the Irish Question. But is the severance necessarily permanent? As we have suggested, racial, geographic, and economic differences between the units composing the island of Great Britain have not made for weakness in the Union, and these differences are less marked in the case of the two Irelands. Their real union would be for mutual advantage; it is certainly a necessity for the best development of Ireland along economic and social lines—a development which would solve the Irish problem.

BIBLIOGRAPHICAL REFERENCES

Ernest Barker: Ireland in the Last Fifty Years (1866-1916), Clarendon Press, Oxford, 1917.

O. J. R. Howarth: A Geography of Ireland. (The Oxford Geographies.) Clarendon Press, Oxford, 1911. Contains an interesting series of maps of population density and movement. See also the sections referring to Ireland in the volume on the British Isles in "The Oxford Survey of the British Empire," Clarendon Press, Oxford, 1914.

Sir Horace Plunkett: Ireland in the New Century, London, 1904.

GEOGRAPHY IN RECENT BOOKS ON EDUCATION

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One of the recent words in education is "motivation." It is a new name for an old process; and new ways of stating old principles are legitimate if they do not conceal what is good in the old and if, at the same time, they bring a truth to those to whom the old has not brought it.

I. MOTIVATION

In "Motivation of School Work," by H. B. Wilson and G. M. Wilson (Houghton Mifflin Co., 1916), may be found a discussion of the motivation of geography. Geography, these authors point out in introducing the subject, first developed an extensive subject matter; the second step gave to this subject matter a formal scientific organization; and the third step, now being taken, is to reorganize the subject from the standpoint of the learner and adapt it to his interests and needs. In this adapting process lies the keynote of motivation.

One of the steps in motivating the subject of geography, according to this book, is the elimination of a large part of the work that has always been connected with map study and other formal phases of geography. Casual use of this phrase, "map study," conveys a wrong impression; it is not map reading that is decried, but rather the learning and reciting from maps, wall maps for instance, of long lists of cities, capes, bays, and the like. This is in line with the work which geographers have been advocating for a number of years, but which apparently percolates very slowly into the graded schools. The authors in expanding this idea say:

> Facts in geography must be secondary. In teaching children, the only rational aim must be the geography method and habit; and that can be best built up through the selection of real problems which have a vital connection with the interests of the child. Where such work has been successfully organized, the results are more satisfactory, even when tested by the accumulation of facts alone.

The elimination of place names is one of the hardest lessons set for the grade teacher. In "Recreation for Teachers," by Henry S. Curtis (The Macmillan Co., 1918), the author advises such a step in his chapter on "Reducing the Strain of Teaching" and insists that the old-time school was essentially a study of words.

One would naturally expect in school systems which are the most highly motivated that the motivation of school subjects would also reach a high degree of perfection. In the completed system, such an expectation might be realized; but there appears to be no co-ordination between the advanced steps taken in promoting a system like the Gary System and in advancing the type of work in some of the fundamental subjects. The following quotation is from "The Gary Schools," by Abraham Flexner and Frank P. Bachman (General Education Board, New York, 1918):

> Periods devoted to geography were usually divided equally between so-called study—a form of silent reading—and recitation. There was no supervised study. Lessons were invariably assigned by pages or by general subject, mostly without comment by the teacher. The children read over the assignments chiefly with a view to finding the answers to the questions printed at the end of the section. At the end of the allotted study period, the recitation began. The teacher, with book in hand, put seriatim the above-mentioned questions, occasionally adding one or more on her own initiative. The answers of the children were brief and deficient in detail; this, whether they remembered for the moment what the text contained or whether they read the answers from the open books before them. The teacher usually added very little; there was little class discussion, outside reading was seldom required. Some of the seventh and eighth grade geography and history and almost all that of the middle grades was indeed little more than a slight reading exercise.

Another step towards motivation in geography as outlined in "Motivation of School Work" is the elimination of all subjects which cannot be connected in some vital way with the child's own experience or which cannot be thrown into a problem that appealed to the child as really worth while, where "really worth while" is interpreted as intensively interesting to him.

These two steps, the elimination of many place names and the use of problems, are not new in the field of geographic experience, but the ideas have only recently appeared in general books on education. The difficulty in the general acceptance of a policy of

elimination of place names lies in the lack of discrimination between mentioning place names and teaching place names. To teach a city, London for instance, so thoroughly as to give to the seventh-grade child an adequate conception of it, requires more than a sentence or two in passing; there is involved some reference work, some comparison, some consideration of its importance in commerce, some idea of its contacts with other large centers, and so on. In other words, within the limits of the time prescribed for geography in a school year, the teacher has time to teach a few place names only. The hearer of lessons has time for every place name that appears in the text or on the map. A marked distinction should be made between knowing and memorizing, between teaching and mentioning place names.

The problem treatment of subject matter aids in the elimination of place names by placing the emphasis on other things, it avoids the use of independent and scattered facts, and it is an impetus to judicial questioning. There appears to be a deep rut in which the questioning faculty, in geography at least, has been running. In a study of questions in geography set for the grade schools in the leading cities of the United States (Geography in Practise and Theory, *Educational Rev.*, Vol. 55, 1918, pp. 30-40), it was found that it was possible to unite over 90 per cent of all of the questions under seven headings; these questions began with the words (i) Define, (ii) Compare, (iii) Explain, (iv) Name, (v) Locate, (vi) Trace, and (vii) Describe. The fourth (Name) was the most common, 42 per cent of 1,038 questions beginning with this word. In one city 70 per cent of the questions given out during one period of examination began in this way. The problem method is one way out, not only of this difficulty, but of others; and, because the lessons through the use of this method can be made worth while and interesting, it is advocated as a step in motivating the geography lesson. There is nothing new in the method, however, and the designatory title is used to stress the necessity of placing the brunt of the recitation and study by the pupils on thinking rather than on memorizing. A careful disciple of this method is apt to plan her lessons and therefore get a larger result from her teaching than the teacher who is a slave to a text-book.

The authors of the "Motivation of School Work" sum up the chief motives in geography thus:

1. Curiosity with reference to the world and its people.
2. Relation of geographic facts to economic values, as developed from real problems of the child.
3. The social value of geographic data in furnishing a basis for the understanding of current happenings, for the planning of trips and outings, and for reading and conversation.
4. The play motive involved in planning grown-up experiences and likewise in the use of facts in games and contests.
5. The connection of geography with romance and adventure.

II. SOCIALIZATION

A second vein of thought apparent in some of the recent books on education is the socialization of school subjects. In "The School as a Social Institution," by Charles L. Robbins (Allyn & Bacon, 1918), the following statement appears concerning geography:

> Mere knowledge of the facts of surface geography "can hardly be said to be of richest social significance." The most important function of the group of sciences centered about geography in the elementary school is to aid in the process of socializing the children to whom they are presented.

The author goes on to explain that the selection of the materials of geography must be from the human rather than the scientific standpoint—the earth to be studied not as one of the planets but as the scene of the struggle for human progress; mountains not as physical phenomena but as obstacles which man has had to overcome. These statements, although they are appearing under a somewhat radical title, will have no startling effect upon the geographers of today. If these assertions had been presented in the days of the study of pure physiography some exception might have been taken to them; for a number of years past, however, the human phase has had almost the entire attention of the geographer.

Mr. Robbins traces the influences that lead away from socialization in the history of the subject: first, in geography as with other sciences, the modern school, he says, is infected with much of the medieval attitude towards it, namely, a great deal of naïve

interest in the curious and extraordinary; second, the object lessons of Pestalozzi—whose influence was important in securing for geography a place in the curriculum—were designed to give training to the senses rather than to emphasize a social point of view; and third, weight has been given to the disciplinary conception of education.

Notwithstanding all temptations to run off into bypaths there has been a steady progress in the direction of the idea that science in general, geography in particular, should make much of the fact that it is humanity that gives significance to the facts of any science.

III. The Teacher

That the teacher's part of the work in presenting the subject matter of geography is more difficult than it is in some other lines of study is almost an axiom. Geography textbooks present a wealth of material, and from it all the teacher must select the fundamental items. Selection is influenced largely by the point of view one takes of the scope and content of the subject; but, whatever the view, selection is necessary at all times. To quote further from C. L. Robbins:

The social point of view tends towards an effective selection and arrangement of material that has real value.

A second quotation on this theme is from Julius B. Arp in "Rural Education and the Consolidated Schools" (World Book Co., Yonkers, 1918):

Nowhere else is the discrimination, alertness, and resourcefulness of the intermediate or grammar grade teacher more fruitful of results.

Here the reference is to assignments in geography where most failures in its teaching occur. Attempts to cover everything in the textbook, indiscriminate use of all the place names mentioned in the text, recitation of memorized facts of a country without correlation, and dependence upon the items of the textbook regardless of the date of publication—these are some of the directions where lack of judgment has been displayed.

Alfred Lawrence Hall-Quest in "The Text Book: How to Use and Judge it" (The Macmillan Co., 1918) quotes from the geographic standards in Cincinnati the gist of the teacher's work in organizing her lesson procedure:

a. Directions in how to study, together with real problems, topics, questions, and suggestions.
b. Good organization of subject matter, matter of appealing interest to children, and not disconnected facts.
c. Closely associated matter so that there is a natural progress.
d. Frequent reviews for comparison.

IV. OUTLINES

Two outlines from new books are introduced below. The first, from "The Rural Teacher and His Work," by Harold W. Foght (The Macmillan Co., 1918), expresses the view of a writer on rural education as to the distribution of geography work. Space assignment probably is not correlative with importance in the outline. The weightiest criticism of outlines of this kind is that they leave too much to the selection of the teacher. Thus, under topic 7 below, the directions are neither clear nor conclusive. If, as is generally admitted, the rural school-teacher is not the equal of the graded school-teacher, then an outline for her use should contain a definite content and be suggestive, as well, as to lines of procedure. The outline which in the book is labeled "a few suggestions" indicates how far one writer carries the home phase of geography. In general, this is the usual emphasis in books which discuss the problems of the rural schools.

1. Begin always with the known and seen.
   a. First lesson at school—direction.
2. School and home geography.
   a. Locate and draw school grounds—locate in reference to home farm.
   b. Complete study of all space between school and home.
   c. Make a study of local topography. Utilize hills, creeks, ponds, etc., for classifying land and water forms.
3. History of the farm.
4. Produce of the farm.
   a. Draw map of the farm—designate various field crops, meadows, wood lots, pasture, orchards, etc.
5. Industries of the farm community—this should include the "trading center."
   a. Study the railroads and highways; study such industries as dairying, mining, lumbering, quarrying, shipping of stock, grain, and other produce.

6. Trip to trade center.
   a. What becomes of farm products brought to town?
   b. What is the origin of the coffee, tea, oranges?
7. The larger study.
   a On these known experiences build a superstructure of geography using what in the mass of geographic materials is useful, eliminating all that is useless and encumbering.

A second outline is based upon the discussion as to what a course in geography should include. This is taken from "The Motivation of School Work," mentioned above:

1. Study based on local interests in lower grades.
2. Brief world-wide view.
   Minimum of locational geography: emphasis upon the economic and industrial phases. Tend to give quick, interesting, and sympathetic view of peoples.
3. Intensive study of the United States, with particular emphasis on some region to make it stand out vividly and enable it to serve as a basis for other regions studied in less detail.
4. Foreign countries.
   Attack each country as a problem, centering upon the competition or source of needed supplies.

V. Scales for Measuring Attainment

A number of attempts have been made to construct scales for testing a pupil's ability in geography, analogous to the scales now in general use in other branches of study. So far all of the scales advocated have a very limited use, and none have passed beyond the experimental stage. Some references are made to these testing schemes in recent books on education, but the subject is too large a one to be encompassed within the limits of this article. A summary of some of these scales together with a suggested type of scale may be found in the 17th Year Book of the National Society for the Study of Education (pp. 27-39) in an article on "Determination and Measurement of Minimal Essentials in Elementary School Geography," by M. E. Branom and W. C. Reavis. Other references on tests in geography are given in a "List of References on Educational Tests and Measurements," Bureau of Education, Library Leaflet No. 2, April, 1919.

VISUALIZING RELATIVE HUMIDITY

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Most students attacking the study of moisture for the first time find difficulty in understanding the problems commonly considered in a discussion of relative humidity. This difficulty is due chiefly to the invisibility of the material under consideration and is particularly evident among students who have had little training in the physical sciences. The writer for the last three or four years has found the scheme described below of great value in aiding the student to visualize the terms used and to visualize the changes in the *actual* (absolute), *possible,* and *relative humidity* that take place as the air is heated or cooled.

Visualizing the Terms Used

1. The *capacity* of a given space for water vapor (also known as the *possible humidity*) depends upon the temperature. The possible humidity increases with increasing temperature and, moreover, increases at an increasing rate. This capacity is expressed in grains per cubic foot of saturated air.

The *possible humidity* at —10°, 0°, 10°, 20°, etc., of temperature may be visualized by a diagram representing a series of jars of equal cross section. In Figure 1 the height of each jar is proportional to the number of grains of water vapor held. The capacity of a cubic foot of air at —10° is only .35 grains. In the diagram this is represented by a small jar (A, Fig. 1). At 50° the possible water vapor that may be contained in a cubic foot of space is 4.09 grains. This is represented by a jar of medium height (G, Fig. 1). At a temperature of 100° the capacity is 19.79 grains, which is represented by a tall jar (L, Fig. 1).

What happens to the possible humidity, or, according to our scheme of visualizing, to the height of the jar, when the air is warmed? Suppose air at 10° (C, Fig. 1) is warmed to 50° (G, Fig. 1), the capacity is increased from .84 grains of water vapor per cubic foot to 4.09 grains per cubic foot. This increase in capacity may be visualized by imagining that the sides of the

jar are pushed up. If the air is warmed to 70°, the sides have gone up so that the capacity has become 7.9 grains. If warmed to 100°, there is a further extension so that the capacity has become 19.79 grains.

In a similar way cooling air may be thought of as a lowering of the sides of the jar—a reduction of the capacity, therefore. If air at 100° is cooled to 50°, the capacity has been reduced from 19.79 to 4.09 grains of water vapor per cubic foot. The jar representing the capacity of the air at 50° is only about one-fifth the height of the jar representing the capacity at 100°.

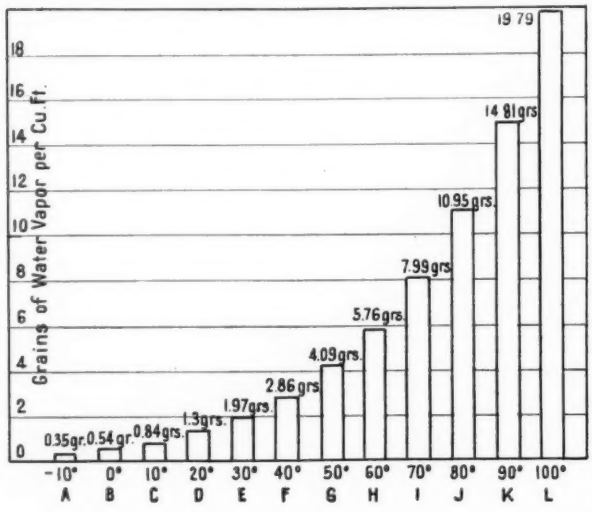

FIG. 1—Diagram showing the capacity of air for water vapor (possible humidity) at successive temperatures. L., capacity at 100°, reads 19.79.

2. The *actual* (absolute) *humidity* is the water vapor actually present. It is expressed in number of grains of water vapor per cubic foot.

3. *Relative humidity* is the "percentage of fullness." It is the ratio of the *actual* to the *possible*. Relative humidity is expressed in percentage. Air with a relative humidity of 100 per cent is *saturated*.

The relation of the *possible, actual,* and *relative humidity* may be visualized readily. In Figure 2 the jar G represents the capacity (or the possible) of the air at 50°. This is 4.09 grains of water vapor. But the jar is only half full (2.04 grains). The relative humidity is, therefore, 50 per cent. Similarly L (Fig. 2) is half full, and the relative humidity is then 50 per cent; but in this case the actual is much larger, being equal to 50 per cent of 19.79 grains, or 9.895 grains. In C the relative humidity is 75 per cent since the jar is three-fourths full. The possible humidity is .84 grains, and the actual three-fourths of .84, or .63

grains. A comparison of C with either G or L shows that air with a relative humidity of 75 per cent may contain much less water vapor than air with a relative humidity of 50 per cent. Air in Greenland, with a relative humidity of 90 per cent, contains much less water vapor than air in the Sahara, with a humidity of 20 per cent. (Compare, for example, C and K in Fig. 2.)

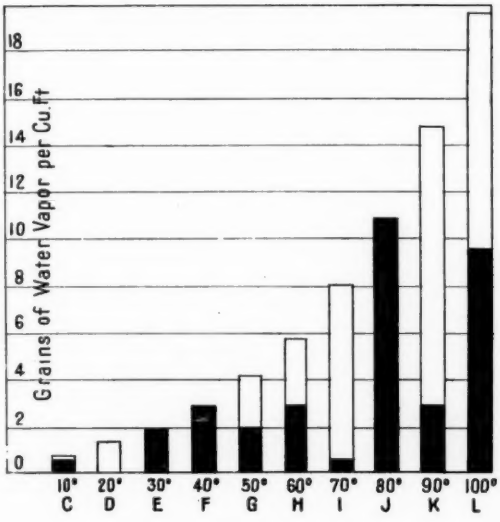

FIG. 2

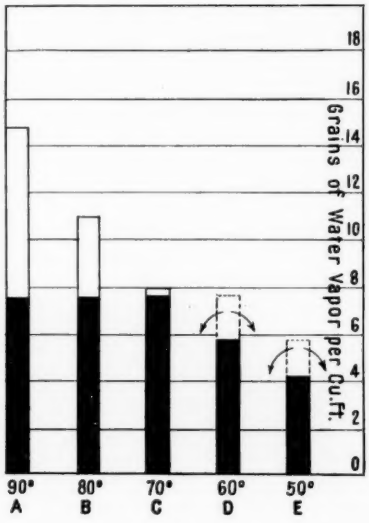

FIG. 3

FIG. 2—Diagram illustrating the effect of the heating of air on the relative humidity. See the text for explanation.

FIG. 3—Diagram illustrating the effect of the cooling of air on the relative humidity. See the text for explanation.

Jars E, F, and J (Fig. 2) represent saturated air at 30°, 40°, and 80° respectively. Jars C and I have the same actual but vastly different relative humidities, because the possible humidity of I is 7.99 grains while that of C is but .84 grains.

EFFECT OF THE HEATING OF AIR ON THE RELATIVE HUMIDITY

What effect does heating air have on its *relative humidity?* Let us suppose saturated air at 40° (F, Fig. 2) is heated gradually to 90°. Heating air, as earlier shown, increases the capacity, that is the sides of the jar rise. Since in the heating it is assumed that no water vapor is added, by the time a temperature of 60° is reached (H, Fig. 2) the relative humidity has been reduced about 50 per cent; for at 60° the capacity (or possible humidity) is 5.76 grains and the actual humidity is 2.86 grains. The jar

(H) is shown to be about half full. At a temperature of 90° (K, Fig. 2) the capacity has reached 14.81 grains (the sides of the jar have risen), and, since the actual humidity remains the same, the relative humidity is 2.86 divided by 14.18, or 20 per cent.

Warming air, then, increases the capacity (the jar becomes taller), and, since the *actual* remains the same, the *relative humidity* is reduced for the jar becomes relatively less full.

The dryness of the air in our houses in the winter illustrates the effect of heating air. Outside air at a temperature, say, of 10° and with a relative humidity of 75 per cent (represented by C, Fig. 2), when drawn into our houses and heated to 70°, has its relative humidity reduced to about 10 per cent (represented by I, Fig. 2).

Effect of the Cooling of Air on the Relative Humidity

When air is cooled its capacity is reduced, as earlier stated, that is the sides of the jar are lowered. Air, for example, at 90° (possible humidity 14.81 grains) having a relative humidity of 50 per cent (the actual then is 7.4 grains and is represented by A, Fig. 3), if cooled to 80°, has its relative humidity increased. At 80° (represented by B, Fig. 2) the humidity has become 7.4 divided by 10.95, or 68 per cent. At 67° the air reaches the saturation point, that is the sides of the jar have been lowered to the point where the actual equals the possible humidity. In further cooling from 67° to 60° precipitation takes place, the amount being the difference between 7.4 grains, the possible humidity at 67°, and 5.76 grains, that at 60° (represented by D, Fig. 3). Since at 60° the actual equals the possible humidity (the jar is still full), the relative humidity is 100 per cent. In cooling from 60° to 50° there is further precipitation, visualized as the difference in the capacity of the jar at 60° (D, Fig. 3) and the jar at 50° (E, Fig. 3).

Cooling air, then, increases its relative humidity (the sides of the jar are lowered) until saturation point is reached (the sides are lowered until the jar is full). Further cooling results in condensation or precipitation (some of the water vapor in the jar runs over because the sides are lowered), the relative humidity remaining 100 per cent (still the jar remains full).

HUMIDITY CHANGES IN THE PASSAGE OF AIR ACROSS A MOUNTAIN

These two laws, regarding the effect of heating and cooling air, find their illustration in nature in the changes that take place in the humidity of air during its journey over a mountain. Let us imagine a mass of air (A, Fig. 4), having a relative humidity of 75 per cent, moving from sea level up a mountain slope. The ascending air is cooled by expansion (adiabatic cooling),[1] and this cooling reduces the capacity (the sides of the jar are lowered). At B the air reaches saturation point (the sides of the jar are lowered until the jar is full). From B to the top of the mountain

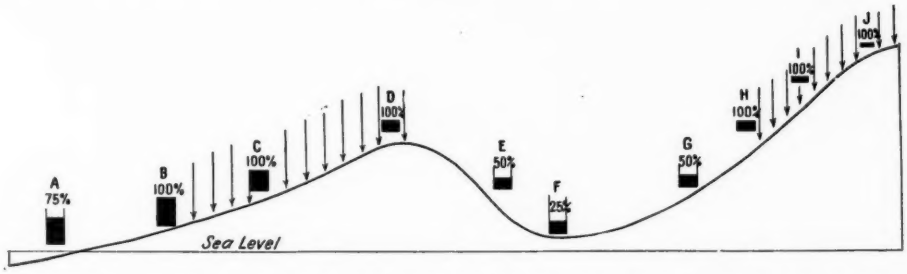

FIG. 4—Diagram illustrating changes in the humidity of air in its passage across mountains from sea level.

precipitation results. At D the capacity has been much reduced (the sides of the jar have been much lowered), yet the air is saturated. In the descent from D to F the air is warmed 5.2° F. for every 1,000 feet. This warming of the air increases the capacity (the sides of the jar rise), and thus the air becomes dry. In the ascent of the second mountain theoretically no precipitation takes place until H is reached (at the same elevation as D), but above this point cooling results in further condensation (visualized as the result of a lowering of the sides of the jar). At J, although the relative humidity is 100 per cent, little actual water vapor remains.

From the diagrams it is evident that precipitation does not take place on the windward slopes of a mountain until the ascending air is cooled to saturation point. The windward sides of the mountains tend to be wet because the air is ascending and cooling, the leeward are dry because the air is descending and warming.

[1] Cooling is at the rate of 5.2° F. per 1,000 feet until saturation point is reached. Condensation results in the liberation of latent heat, and thus the rate of reduction of temperature is thence much lessened.

The statement that the lee side is dry because the air has lost its moisture on the windward side is a poor way to put it, for rain falls on the windward slopes of the second mountain that lie above the altitude of the first, and it would fall on those of a third mountain if it were higher than the second.

THE SCHOOL PROBLEM IN HAWAII

Vaughan MacCaughey, Superintendent of Public Instruction in Hawaii, has recently described the "polyglot and polychrome" character of the schools of Hawaii (The Racial Elements in Hawaii's Schools, *Mid-Pacific Magazine*, September and October, 1919). The outstanding circumstances determining this character are, first, the rapid decadence of the native Hawaiian in contact with modern civilization; second, the agricultural development of the islands by Europeans and Americans; third, the demand for plantation labor (compare the first article in this number of the *Journal*, Tropic Isles in the Pending Settlement). The result is summarized by Mr. MacCaughey: "Hawaii presents the remarkable picture of a thin veneer of white Americans overlaying and controlling a dark-skinned population, predominantly alien, Asiatic, male, landless, homeless, non-Christian, non-English-speaking, and illiterate." There is, however, a considerable and increasing population of school age and an analysis of this school population exhibits the educational problem in concrete form. Percentage enrollment according to races in the schools for 1917 is thus: Hawaiian, 9; part-Hawaiian (mother Hawaiian), 13; Japanese, 40; Chinese, 10; Koreans, 1.3; Portuguese, 15; Spanish, under 2; Porto Ricans, 3; Filipinos, 1.5; Russians, Germans, British, about 1.3; Americans (whites of American ancestry), 4.6.

The percentage of Hawaiians is diminishing rapidly; it has decreased over 70 per cent during the last two decades; the small number of Spaniards is also declining. The Portuguese enrollment is large. Portuguese laborers were introduced into the islands at a comparatively early date; they now constitute the chief "white" labor. But by far the most significant feature of the

enrollment is the high and rapidly increasing percentage of Japanese children. In 1900 they numbered 1,300; in 1917, 15,000. Correlated with this is the growth of the so-called Japanese language schools, where the children receive instruction in the tongue of their fathers. Today there are over 100 of these schools and they are attended by most of the Japanese children in addition to the public schools.

Since the time of annexation there has, of course, been a considerable increase in the number of American children in Hawaii, but it has been and is limited by the social and economic conditions, which are typically those of white occupation of the tropics. The American element, capitalistic, professional, official, is superimposed upon and wholly isolated from the great mass of the population. Whether an American middle-class population can be established in the islands is a question, but until it is the educational problem of "Americanizing" Hawaii will not be solved.

GEOGRAPHICAL CLASSICS

It is a principle of modern education that the text-book must be supplemented by the reading of other books which are not texts. This supposes, first, that the text-book does not contain all the information that the student should have, and second, that it is not in just the text-book form that the student should acquire all of his information. Let us consider the second of these two suppositions.

We are all familiar with the idea of the "classics" in language instruction, but there are also classics in the sciences and especially in geography, because its descriptive content is so large. Its limits include not only scenic descriptions which lend themselves to vigorous and beautiful literary expression but also a great part of man's activities, which have a wide range of dramatic action and feeling even in their relation to the physical aspects of the earth. The half-concealed and furtive character of much of the life of the denser tropical forests, no less than the nomadic and

romantic quality of the life of the desert dweller, permit the geographical writer to give to his scientific descriptions a richer literary flavor than is possible in the fields of geology and biology and economics. The desert and steppe region that gave birth to the ambitions and determined the scope and power of Tamerlane and Ghengiz Khan, must be brought before us with full effect if the place of these leaders in history is to be well understood. To no less degree do they enter into the modern life of the people in those self-same regions; and for this reason they have a place in geographical science.

To satisfy this recognized need, there have been written many supplementary books in geography, but none of them quite covers the field of this suggestion. We should like here to urge the need for a collection of classical descriptions of the highest rank. They should not be selected solely from the standpoint of literary quality, though this should be one of the leading considerations. They should be capable of direct scientific use. Their style and innate quality should be a source of inspiration, the thing that will lift the lesson of the day out of the routine of text and class-room work and give it dramatic action.

It was something akin to this that Herbertson tried to do in his "Descriptive Geography From Original Sources," though his main object seems to have been to stick pretty closely to the text-book content and thus give his books that direct educational mission which gratifies the heart of the educational publisher. The result is very useful and commendatory, but there is still a field beyond that requires cultivation. Let us take a single concrete example.

The outstanding quality of the weather of the so-called temperate zone is that it is not temperate. Professor Mark Jefferson has well observed that the name that best fits it is not "temperate" but "inclement." Every one of us is familiar with sudden shifts in the weather, with a rise or fall of twenty degrees and more in twenty-four hours. The writer recalls a change of 18° F. in the time it took to go by street car from Cambridge to Boston. Such a thing is unthinkable, impossible, in low tropical countries. It is distinctly the marked, the amazing quality of our weather. Suppose one wishes to make this fact live in the mind of the student.

Wouldn't the best way be to read the most striking description of such a change that exists in English? I know of none so good as that to be found in a story by Rudyard Kipling entitled "They," contained in Traffics and Discoveries. It follows:

There came at last a brilliant day, swept clear from the southwest, that brought the hills within hand's reach—a day of unstable airs and high filmy clouds. . . . As I reached the crest of the Downs I felt the soft air change, saw it glaze under the sun; and, looking down at the sea, in that instant beheld the blue of the Channel turn through polished silver and dulled steel to dingy pewter. A laden collier hugging the coast steered outward for deeper water and, across copper-colored haze, I saw sails rise one by one on the anchored fishing fleet. . . . When I reached the beach road the sea-fog fumed over the brickfields, and the tide was telling all the groins of the gale beyond Ushant. In less than an hour summer England vanished in chill grey. We were again the shut island of the North, all the ships of the world bellowing at our perilous gates; and between their outcries ran the piping of bewildered gulls. My cap dripped moisture, the folds of the rug held it in pools or sluiced it away in runnels, and the salt-rime stuck to my lips.

If you know of a better description will you send it to the Editors? If you know of equally good descriptions for other geographical subjects will you send them also? From time to time we will print and distribute them for the benefit of others. Remember, please, that they are not all found in recent books. The descriptive power of Marco Polo has rarely been surpassed. Darwin, many years ago, wrote a book on earthworms that is still the leading book in the subject. The best description of the work of aggrading streams on a piedmont slope was written by Miers over a hundred years ago, in a book of travels. The field, indeed, is of the widest. James Lane Allen is a novelist unsurpassed in his descriptions of the Kentucky Blue-Grass Country. Zane Grey's descriptions of the western desert country are among the best, combining a charming style with faithful portrayal of the scenery and people of the West. The romance of the sea has rarely been captured so successfully in a piece of serious writing as in William Wood's "Elizabethan Sea-Dogs" published in 1918. "Go forth and find."

GEOGRAPHICAL PUBLICATIONS

Pictorial Geography. The National Geographic Society, Washington, D. C.

The National Geographic Society's Magazine is known and used by many geography teachers as a source of excellent illustrations. The demand for such illustrations has led the Society to issue this special series—Pictorial Geography (see the article Sight-seeing in School by Jessie L. Burrall in the June number of the National Geographic Magazine). The present series includes 4 sets, two of 24 pictures, two of 48. The two smaller sets illustrate life in the Sahara and among the Eskimo respectively.

Programs for the beginning of formal geography study are very varied but many teachers begin with a description of simple types of life in various regions of the world or at any rate plan for such study early in the intermediate grades. It is unnecessary to say how essential pictures are at this stage—where so much can be told pictorially. The National Geographic Society's pictures of the Sahara and Eskimo Land are well selected and arranged for this purpose. Take the Saharan set for instance. Here are the two types of environment, the oasis with the oasis dwellers and the desert with its wind-rippled sands (a type in the stony desert is also shown); the date palm, both individual trees and the palm garden excavated in and protected from the encompassing sand; the ostrich; several pictures of camels; the preparation of dates for export; markets of the desert to the north (Tunis) and south (Timbuktu); a member of that famous institution, the desert police. Simple and readable text accompanies each illustration.

Most of the pictures in the set "The Land, The Water, and The Air," illustrative of physical geography, may well be used individually in regional geography. The set on the United States aims at giving a general view of the country; the pictures are miscellaneous in character, many are of scenic wonders. The compilation of sets on the regional geography of the United States would provide valuable additions to the series.

Prices and other particulars regarding the Pictorial Geography will be found on the opposite page.

Measuring the Effects of Supervision in Geography. By S. A. Courtis, *School and Society,* Vol. 10, No. 238, 1919, pp. 61-70.

A paper for those interested in educational measurements and in the general problem of supervision in schools. It gives the results of an investigation carried out in Detroit.